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Wagner
Free Institute
# of Science
of Philadelphia

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Annual
Announcement
1914-15

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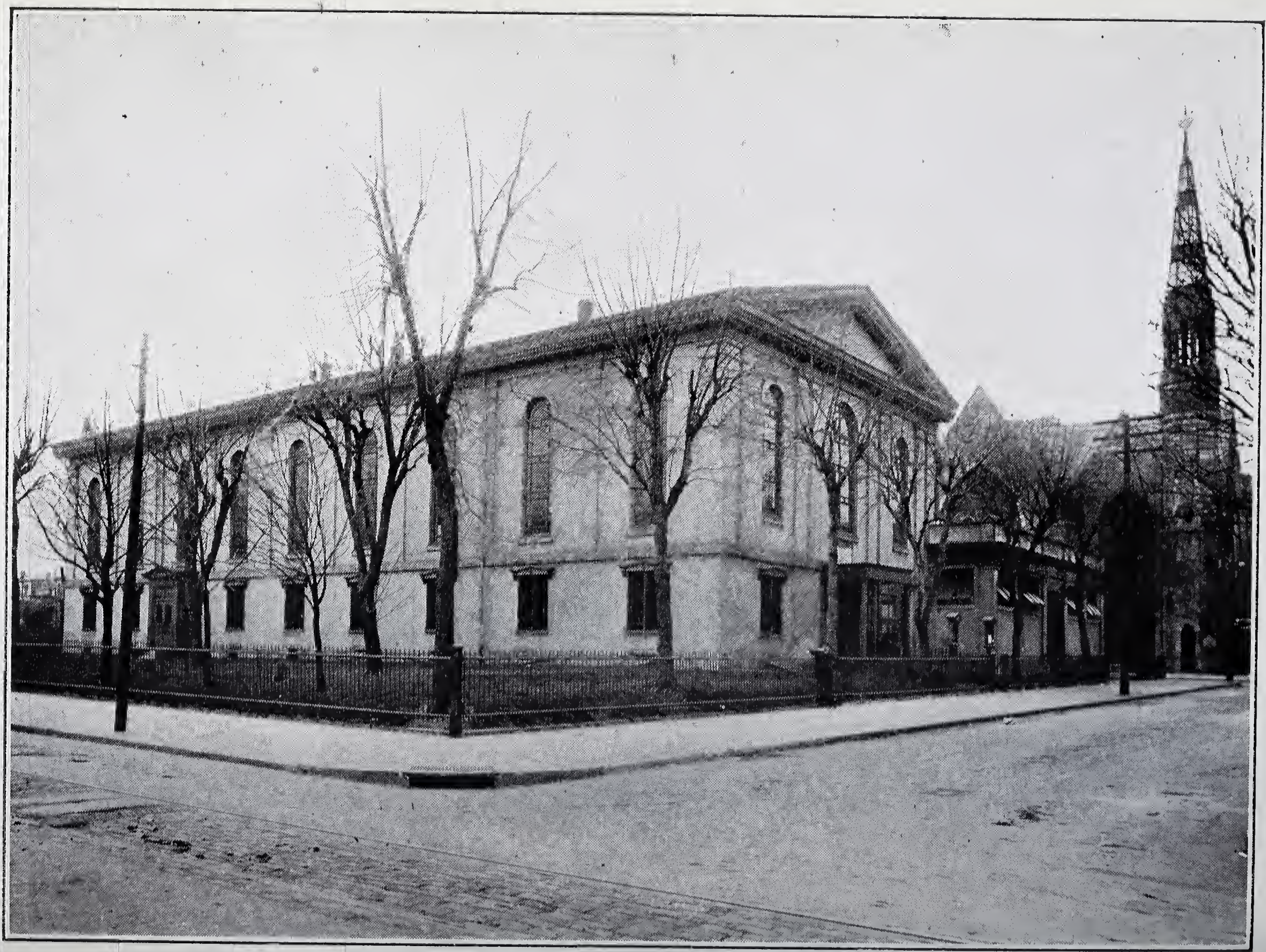


[illegible] OF THE WAGNER FREE INSTITUTE OF SCIENCE

Wagner
Free Institute of Science
of Philadelphia

ANNUAL
ANNOUNCEMENT

Sixty-Seventh Year

Philadelphia
1914

TRUSTEES.

President, Samuel Wagner.
Secretary, Joseph Willcox.
Treasurer, J. Vaughan Merrick.
Sydney T. Skidmore. Harrison S. Morris.
Samuel T. Wagner. Henry Leffmann, *Chairman*.

FACULTY.

William Healey Dall, A.M., Sc.D.
Honorary Professor of Invertebrate Paleontology.

Henry Leffmann, A.M., M.D., Ph.D.
Honorary Professor of Chemistry.

William B. Scott, A.M., Ph.D., LL.D.
Honorary Professor of Geology.

George F. Stradling, Ph.D.
Honorary Professor of Physics.

Samuel Tobias Wagner, B.S., C.E.
Professor of Engineering.

Spencer Trotter, M.D.
Professor of Zoölogy.

Samuel C. Schmucker, Ph.D.
Professor of Botany.

Leslie B. Seely, B.A.
Professor of Physics.

Charles H. LaWall, Ph.M.
Professor of Organic Chemistry.

David W. Horn, Ph.D.
Professor of Inorganic and Physical Chemistry.

Mayville W. Twitchell, Ph.D.
Geology.

John G. Rothermel, *Director.*

Historical Note.

The Wagner Free Institute of Science owes its establishment to the liberality and public spirit of William Wagner and his wife Louisa Binney Wagner. In his early life Professor Wagner made extensive voyages in the service of Stephen Girard, and had opportunities to visit scientific institutions and make the acquaintance of scientific workers. He soon developed a strong interest in the natural sciences, especially geology and mineralogy, and devoted a large part of his life to studying these topics and collecting material to illustrate the teaching of them.

In 1847 he began to give free lectures at his home, near the present location of the Institute building, at that time in the rural section of the county. In 1855 the Institute was incorporated by the Legislature, a faculty was appointed and lectures were given at Commissioners' Hall, Thirteenth and Spring Garden Streets, by permission of the city authorities. In a few years the city was obliged, by its own needs, to withdraw the privilege of the hall, and Professor Wagner arranged to erect a suitable building on his own property. This was completed in May, 1865, and lectures at once given in it. In 1864 a deed of trust was executed by Professor Wagner and his wife, furnishing a permanent endowment of the Institute.

In 1885, by the death of the founder, the care of the Institute passed entirely into the hands of a Board of Trustees, and since then many improvements have been made in the building, and extensive additions to its equipment in the museum and library and in scientific apparatus. In 1901 a wing was built for the use of a branch of the Free Library of Philadelphia.

The lecture-room is capable of seating about six hundred persons and is equipped with excellent lecture facilities. The collection of physical apparatus comprises many of the older forms which have historic interest and a large number of the most recent invention and construction.

FACILITIES FOR INSTRUCTION.

LECTURES AND CLASS-WORK.

Instruction at the Wagner Free Institute of Science is conducted by means of public lectures, supplemented by class-work, and is without charge and without restriction of race or sex. The class-instruction is given partly at the close of each lecture, partly by written exercises. The museum and reference library of the Institute are available for aid in the instruction work and are freely used. In addition, the Wagner Free Institute Branch of the Free Library of Philadelphia affords abundant opportunities for collateral reading.

At the close of each course of lectures an examination is held, to which those who have attended the classes are admitted, and on passing such examination the pupil is awarded a certificate. Certificates are awarded at a public meeting held in May of each year.

The lecture courses are arranged to cover a given topic in four successive years, and to those who hold certificates for each of these courses, a full-term certificate is issued.

Holders of full-term certificates are eligible to membership in the Alumni Association. For information in regard to this see page 9.

Museum.

The Museum covers the whole field of natural science and contains illustrations of all departments of biology, geology, mineralogy, metallurgy and engineering. The specimens are arranged so as to be easily studied and are open to inspection from 2 to 5 o'clock Wednesday and Saturday afternoons, except legal holidays.

Teachers with classes and others desiring to use the museum for special studies can, however, by applying to the office, gain admission to it any week day, except holidays, as above stated, between the hours of 9 a. m. and 5 p. m.

Within the present year the Institute has installed a taxidermy department under the charge of Mr. Robert E. Morris with the object of improving its already fine collections of mammals, birds and fishes, especially its local collections in these lines, so as to make them of still greater value to natural history teachers and students.

Arrangements are also being perfected for afternoon museum talks, illustrated by specimens, the details of which will be announced later.

LIBRARIES.

The reference library contains text-books and works of reference in all departments of science, encyclopedias, many works devoted to literature and an assortment of dictionaries of English, classical and foreign languages. It is open on all regular business days from 9 a. m. to 9.30 p. m., a librarian being always in attendance to assist students.

The circulating library is a branch of the Free Library of Philadelphia. It is open every business day from 9 a. m. to 9 p. m. Books may be taken out under the usual rules of the Free Library. Many periodicals—American and foreign, scientific and literary—are on file.

ACCESSORY SCIENTIFIC WORK.

Two scientific societies meet regularly at the Institute. The Philadelphia Natural History Society meets on the third Thursday of each month except June, July and August, the Philadelphia Mineralogical Society on the second Tuesday of each month except July and August. These meetings are open to all persons.

The Alumni Association holds a public meeting on the third Tuesday in January of each year.

UNIVERSITY EXTENSION LECTURES.

Courses of lectures under the auspices of the American Society for the Extension of University Teaching and The Free Library of Philadelphia given in the hall of the Institute are open to all without charge. These courses embrace a wide range of topics, being usually outside of the scope of the regular Institute courses.

SCHOOL CHILDREN LECTURES.

Under the auspices of The Free Library of Philadelphia illustrated lectures are given to school children on Tuesday afternoons during the winter season. These are elementary and relate to travel, science, history and biography. Small classes of children are also given brief instruction in a "Story Hour."

SPECIAL LECTURES.

By the liberality of Richard Brodhead Westbrook, D.D., for many years a trustee of the Institute, and his wife, Henrietta Payne Westbrook, provision has been made for lectures independent of the general courses of the Institute and covering a wide range of topics.

Details of lectures already delivered under this foundation are given on page 30.

Arrangements are being made for the publication of these lectures in book form.

The course for the session of 1914–15 is being arranged, and details will be announced in a special publication.

RESEARCH.

The Institute has maintained research work since 1885, and has published six volumes of transactions and is about completing the seventh volume. A list of the subjects will be found on page 28. Studies of the vegetation of South Florida are in course of publication.

The income of a special fund is available for lectures and research in chemistry.

ALUMNI ASSOCIATION.

The Alumni Association was organized in 1907, composed of those who have received degrees or full-term certificates of the Institute.

The officers for 1914 are:

President, Henry Leffmann.
Vice-Presidents, Daniel G. Alrich, Edward W. Siegmann.
Secretary, Edgar T. Wherry.
Treasurer, W. C. Hambel.
Advisory Council, P. Caledon Cameron, William J. Reinhold, Maximilian Weiss, and the above-named officers.

The Association holds a meeting in January of each year, which is preceded by a public meeting at which a lecture on some scientific topic is given.

At the annual meeting of 1914 an illustrated lecture on "Ships—Ancient and Modern," was delivered by Mr. George H. Streaker.

CLOSING EXERCISES.

In May of each year the courses of instruction are formally closed by a public meeting at which addresses are given and the certificates awarded.

At the closing exercises in May, 1914, after an address by Professor Samuel T. Wagner, President of the Faculty, and awarding of certificates, Dr. Benj. L. Miller of Lehigh University delivered an illustrated lecture on "Geologic Processes Responsible for Scenery of Western Canada."

FULL-TERM CERTIFICATES AWARDED.

ENGINEERING.

Alfred C. Bauer
Raymond H. Krecker
William A. Taylor

ZOOLOGY.

P. C. Cameron
Sarah E. Fisher
Elizabeth Kirk

ORGANIC CHEMISTRY.

P. C. Cameron

BOTANY.

Sarah E. Fisher

GEOLOGY.

Samuel G. Gordon
Herbert H. Haas

1913-1914 CERTIFICATES AWARDED.

ENGINEERING 3.

Alfred C. Bauer
Charles Brackbill
Arnold W. Bombe
Howard B. Du Bois
George N. Hyland
William C. Knabe
Raymond H. Krecker
William H. Schopfel
Ray N. Spooner
William A. Taylor
Carl Walraven

ZOÖLOGY 3.

P. C. Cameron
Sarah E. Fisher
Elizabeth Kirk

INORGANIC CHEMISTRY 1.

Thomas Darlington
W. J. M. Devine
Wylie H. Flack
Samuel G. Gordon
Herbert H. Haas
H. C. Halberstadt
F. W. Hartzel
George Richards
R. Richter
J. Cecil Rhodes

ORGANIC CHEMISTRY 1.

W. J. M. Devine
Francis W. Hartzel
George Richards
R. Richter
J. Cecil Rhodes

BOTANY 3.

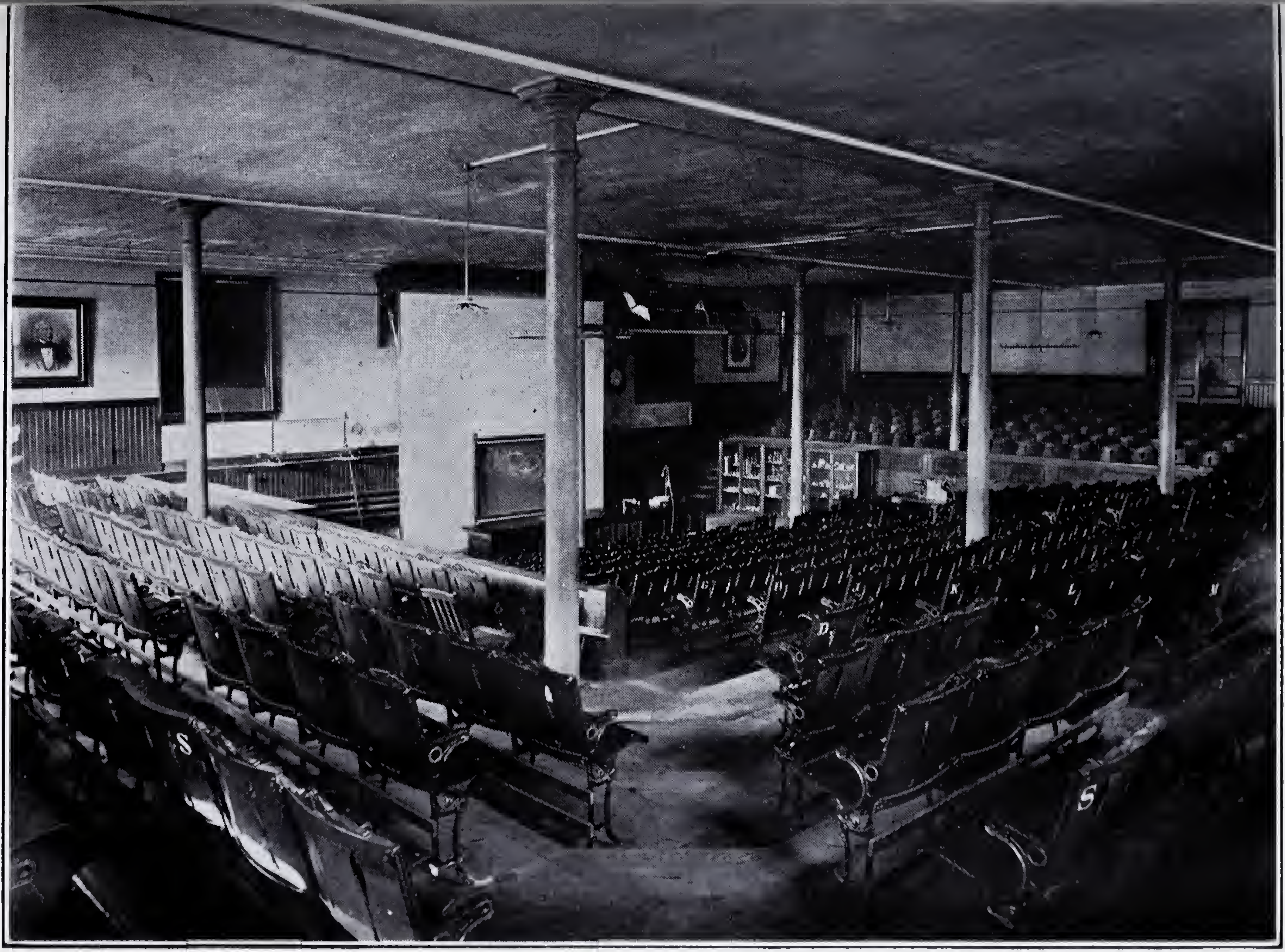
Sarah E. Fisher
William A. Fisher
Hugh F. Munro
Sarah L. Naly
R. Richter
Mai E. Sutton

PHYSICS 4.

Sarah P. Byrnes
Thomas Darlington
Francis W. Hartzel
R. Richter
C. Russell Snyder
Daniel Stewart
Wilfred H. Stine

GEOLOGY 3.

M. G. Biernbaum
J. Frankenfield
S. G. Gordon
Herbert H. Haas
A. A. Jones
William Knabe
A. K. Lobek
R. Richter
Robert Rosenbaum
H. W. Trudell



Auditorium

REGULAR LECTURES

SESSION OF 1914–1915.

ENGINEERING 4.

PROFESSOR SAMUEL T. WAGNER.

Water Supply.—Sewers.—Canals.—Rivers and Harbors.

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1. Friday, September 4.
   Hydrography. Water surveys of all kinds. Soundings. Discharge of streams. Current meters.
2. Friday, September 11.
   Water Supply. Water and its impurities. Analysis,—Chemical and biological. Interpretation of analyses.
3. Friday, September 18.
   Water Supply (Continued). Sources of water. Consumption. Meters. Storage reservoirs.
4. Friday, September 25.
   Water Supply (Continued). Construction of reservoirs and dams of earth and masonry. Distributing systems. Aqueducts. Pipes.

5. Friday, October 2.
   Water Supply (Continued). Purification. Distilling. Boiling. Disinfection. Sedimentation. Filtration. Softening. Straining.

6. Friday, October 9.
   Water Supply (Continued). Rapid and slow sand filters. Their design and construction.

7. Friday, October 16.
   Water Supply (Concluded). Roughing filters. Description of filter plants. Cost. Reduction of typhoid by filtration.

8. Friday, October 23.
   Sewers. Definitions. Sewerage systems. Requirements of a good system.

9. Friday, October 30.
   Sewers (Continued). Location. Determination of amount of sewage and storm water. Formulæ.

10. Friday, November 6.
    Sewers (Continued). Size. Construction. Excavation and refilling.

11. Friday, November 13.
    Sewers (Continued). Materials of construction. Details of construction. Maintenance.

12. Friday, November 20.
    Sewers (Concluded). Disposition. Processes for purification. Disposal of sludge.

13. Friday, November 27.
    Canals. Classification. History. Cross-section. Water supply. Reservoirs. Feeders.

14. Friday, December 4.

Canals (Concluded). Levels. Locks. Locomotion. Ship canals. Notable canals.

15. Friday, December 11.

Rivers. Natural features. Protection of banks. Bars. Inundations. Regulation. Slack water navigation.

16. Friday, December 18.

Harbors. Roadsteads. Harbors, Natural, Artificial. Dikes. Sea walls. Breakwaters.

SPECIAL COURSE.

Chemistry in Relation to Modern Life.

Lectures (8 p. m.) Demonstrations (2.30 p. m.)

HONORARY PROFESSOR HENRY LEFFMANN.

1. Saturday, September 19.

Scope of the Course. Increasing tendency to city life gives rise to complex sanitary problems. Ancient and modern cities compared.

2. Saturday, September 26.

Water-supply. Types of natural waters. Importance of surface water; its character and impurities.

No lecture October 3.

3. Saturday, October 10.

Purification of Water. Filtration, Sterilization. Use of coagulants and germicides. Philadelphia methods.

Saturday, October 17.

Demonstration Visit to Philadelphia Filter-Plant, 2.30 p. m.

(No evening lecture.)

4. Saturday, October 24.
   Sewage and Garbage Disposal. Utilization of wastes.

   Saturday, October 31.
   Demonstration Visit to Philadelphia Experimental Sewage Disposal Plant, 2.30 p. m.
   (No evening lecture.)

5. Saturday, November 7.
   Lighting and Heating Methods. Gas, Electricity. Sun Engines. "White coal." Central heating plants. Smoke nuisance.

6. Saturday, November 14.
   Food Supply. Types of food and their respective values for nutrition. Causes of increased cost of food. Effects of storage.

7. Saturday, November 21.
   Milk and Milk Products. Natural and artificial sources of contamination. Protection of milk-supply. Sterilization and pasteurization. Evaporation. Butter-substitutes.

8. Saturday, November 28.
   Starch and Sugar Foods. Breakfast foods. Candies. Fermented beverages and "soft" drinks.

9. Saturday, December 5.
   Selection and Preparation of Foods. Effects of cooking, pickling and salting. Dangers from raw foods. Accessory foods.

10. Saturday, December 12.
   The Building and Operation of a City. Its close connection with all other features of the "better life." City planning. The Philadelphia errors, past, present and prospective.

Saturday, December 19.

Demonstration Visit to Food-Plant at 2.30 p. m. (Details to be Announced Later.)

(No evening lecture.)

ZOÖLOGY 4.

PROFESSOR SPENCER TROTTER.

Anthropology.

1. Monday, October 19.

   The Nature and Scope of Anthropology, Definition. Wide-reaching relations to all branches of learning. Value as a basis in the study of History, Political Economy, and Religion. "The proper study of Mankind is man."

2. Monday, October 26.

   The Zoölogic Position of Man. Man a vertebrate animal of the Class Mammalia, Order Primates, Sub-Order Anthropoidea, Family Hominidæ. Analysis of the above statement. The Primates.

3. Monday, November 2.

   The Structure of Man. The Sub-Order Anthropoidea, Character of the Families, The Hominidæ, Relationships, Significance of Structure.

4. Monday, November 9.

   Man as a Species. Ancient types: Neanderthal, Heidelberg and Piltdown. Modern Type. The Pleistocene, its typical features and fauna.

5. Monday, November 16.

   The Sub-Species. The Ulotrichi, The Leiotrichi, The Cymotrichi. Fundamental features: Hair, Color, Head-form. The term "Race." Origin of types. Antiquity of Man.

6. Monday, November 23.

   Races and Peoples. Ethnology. Distribution of mankind: Geographical Relations. Africa, The Mediterranean Basin, Asia and America. Island Peoples. The three European races.

7. Monday, November 30.

   Culture. Definition. Primitive Culture, Paleolithic and Neolithic. Metals. Relations of the Ancient and Modern World. The Arts of life: food, clothing and habitation.

8. Monday, December 7.

   The Social State. Primitive society. Beginnings of Agriculture. Domestication of Animals. Primitive Beliefs. Origin of Myths. Influences of Environment. "Fringe Lands."

9. Monday, December 14.

   Population. Its Nature, Basic Factors, Growth, Saturation, Migration. Examples. War. Origination of the Body Politic.

10. Monday, December 21.

    Some Aspects of Modern Populations. Modern Civilization. Facility of Movement. Revolutions of Civilization. Crossings of Types. Social Problems. Concluding Remarks.

INORGANIC CHEMISTRY 2.

PROFESSOR DAVID WILBUR HORN.

Descriptive Chemistry.

1. Tuesday, September 8.
   Hydrogen. Occurrence, preparation, properties. Use as standard.
2. Monday, September 14.
   Oxygen. Occurrence, preparation, properties. Industrial uses of pure oxygen.
3. Monday, September 21.
   Air. Composition. Inert gases. Phenomena of oxydation and reduction.
4. Monday, September 28.
   Water. Composition. Combination as water. Combinations with formation of hydroxids. Thermal phenomena. Nature of acids and alkalies. Hydrogen peroxid.
5. Monday, October 5.
   Chlorin. Occurrence, preparation, properties. Industrial uses. General chemistry of halogens.
6. Monday, October 12.
   Chlorin Compounds. Hydrochloric acid. Hypochlorites, chlorates and perchlorates.

ORGANIC CHEMISTRY 2.

PROFESSOR CHARLES H. LAWALL.

Carbohydrates. Fats, Oils and Waxes.

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1. Wednesday, October 14.
   Cellulose and Derivatives. Cotton, Linen, Wool, Silk, Gun Cotton, Artificial Silk.
2. Wednesday, October 21.
   Starch and Derivatives. Distribution of Starch in Nature. Differentiation of Starches. Dextrin.
3. Wednesday, October 28.
   Sugars. Sucrose from Cane, Beet and Maple. Dextrose from Corn. Levulose. Maltose. Lactose.
4. Wednesday, November 4.
   Oils, Fats and Waxes. Proximate Principles, Olein, Palmitin, Stearin, Cholesterol.
5. Wednesday, November 11.
   Oils, Fats and Waxes (Continued). Occurrence. Method of Preparation. Classification. Emulsions. Toilet Creams.
6. Wednesday, November 18.
   Non-Drying Oils. Oils from Olive, Cottonseed, Almond, Peanut, Sesame, Maize, Mustard. Castor and Lard Oils.
7. Wednesday, November 25.
   Drying Oils. Oils from Linseed, Hemp, Poppyseed, Sunflower Seed. Fish Oils.
8. Wednesday, December 2.
   Milk Fat. Its Commercial Products. Milk, Cream, Cheese, Butter, Oleomargarine and other Butter Substitutes. Household Tests.

9. Wednesday, December 9.

   Fats and Waxes. Palm Oil, Cocoanut Oil, Chocolate Fat, Lard, Tallow, Wool Fat. Animal and Vegetable Waxes.

10. Wednesday, December 16.

   Soaps. Saponification. Laundry Soap, Toilet Soaps, Transparent Soaps, Scouring Soaps, Washing Powders.

BOTANY 4.

PROFESSOR SAMUEL C. SCHMUCKER.

Ecologic and Economic Botany.

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1. Monday, January 4.

   Floods and Plant Distribution. The meaning of ecology. Survival of the fittest. Adaptation to surroundings; water, warmth, light, soil. A mountain island. The distribution of its trees. Ice as a factor.

2. Monday, January 11.

   The Effect of Wind. Latitude and warmth. The glacial lakes. A rocky bluff. The genesis of soil. The transporting power of wind. Transportation by animals. Denudation by wind.

3. Monday, January 18.

   Elevation and Vegetation. Plateau and mountain. Wet and dry sides of mountain. Zones of vegetation in latitude and altitude. The timber line. Ascent since glacial times.

4. Monday, January 25.

A Swamp Society (hydrophytes). Water more to plants than to animals. Submerged plants. Floating plants. Swamp plants. Plants of damp ground. The procession of plants.

5. Monday, February 1.

Desert Plants (xerophytes). The cause of deserts. The fertile soil. The diminished water supply. Condensed plants. Protection by tough coats; by bitterness; by thorns. Oases. Irrigation.

6. Monday, February 8.

American Forests. The tree habit. Conditions of tree life. Our forest trees. Conifers a survival. The modern broad leaf type. Lumbering. Protection from forest fires. Conservation of timber.

7. Monday, February 15.

Our Cultivated Flowers. All plants once wild. We get our flowers (*a*) by importation, (*b*) by selection, (*c*) by cross breeding, (*d*) by "doubling."

8. Tuesday, February 23.

Our Weeds. "Plants out of place." Successful plants. On lawn. By roadside. Spring, summer, fall, winter. Why weeds succeed. Weeds as spurs to industry.

9. Monday, March 1.

The Cereals. The grass family and its structure. The corn belt. A good ear of corn. Breeding corn. Testing corn. Wheat: winter, spring, macaroni. Rice and the tropics. Oats and the north. Culture of cereals.

10. Monday, March 8.

The Fruits of the World. The meaning of a fruit; practical, scientific. Berries. Temperate fruits. Sub-tropical fruits. Tropical fruits. The growing importance of fruits.

PHYSICS 1.

PROFESSOR LESLIE B. SEELY.

Mechanics and the Properties of Matter.

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1. Friday, January 8.

Introduction. Physics defined. The Utility of the Study of Physics. Matter defined. Mass defined. Measurements of Quantity, Extension and Mass. Volume and Density. States of Matter. Time.

2. Friday, January 15.

Motion, Velocity and Acceleration. Motion defined. Rectilinear and Curvilinear Motions. Uniform and Accelerated Motions. Equations of Motion. Simultaneous Motions and Velocities. Resolution of Motions and Velocities.

3. Friday, January 22.

Newton's Laws of Motion. Force, Momentum. Newton's First Law—Inertia. Units of Force. Newton's Second Law. Development of the Equation. Newton's Third Law. Concurrent Forces.

4. Friday, January 29.

Moments of Force. Forces Producing Rotation about a Point. Parallel Forces. The

Couple. Composition and Resolution of Forces. Centripetal Acceleration and Circular Motion.

5. Friday, February 5.
   Work and Energy. Units of Energy, Work and Power. Potential and Kinetic Energy. Transformation and Conservation Energy. Matter and Energy.

6. Friday, February 12.
   Gravitation. Newton's Law of Gravitation. Weight. Equilibrium and Stability. Falling Bodies.

7. Friday, February 19.
   Gravitation (Continued). Falling Bodies further considered. Paths of Projectiles. The Pendulum.

8. Friday, February 26.
   Machines. Purposes of Machines. Six Simple Machines. Principle of Work. Mechanical Advantage. Machine Efficiency.

9. Friday, March 5.
   Machines (Continued). Friction. Thrust and Tension on Rods and Beams. Tension on Cords.

10. Friday, March 12.
    Liquids. Forces due to Weight in Liquids. Pressure in Vessels of Different Shapes. Liquids in Communicating Vessels.

11. Friday, March 19.
    Liquids (Continued). Force transmitted by a Liquid. Pascal's Law. Hydraulic Press. Artesian Wells. Water Motors. Hydraulic Elevators, Rams, etc.

12. Friday, March 26.

Liquids (Continued). Archimedes Principle. Floating Bodies. Specific Gravity.

13. Friday, April 9.

Liquids (Continued). Molecular Forces in Liquids. Cohesion and Adhesion. Surface Films. Surface Tension. Capillary Phenomena.

14. Friday, April 16.

Gases. Similarity between Liquids and Gases. Weight and Density of Gases. Atmospheric Pressure. Barometers. Weather Maps.

15. Friday, April 23.

Gases (Continued). Expansibility and Compressibility of Gases. Boyle's Law. Atmospheric Density and Buoyancy.

16. Friday, April 30.

Gases (Continued). Application of Air Pressure to Machines. Air-Pump. Force-Pump. Siphon. Compressed Air Tools. Air Brake. Diving, Tunneling, etc.

GEOLOGY 4.

MAYVILLE W. TWITCHELL, Ph.D.

Historical Geology.

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1. Wednesday, January 6.
   Materials Available for the Study of Earth History. Characteristics of Rocks. Marks upon Rocks. Topographic Features. Fossils.
2. Wednesday, January 13.
   Principles of Interpretation Used in the Study of Earth History. Uniformity. Vast Time Required. Order of Formation of Rocks. Structural Relations of Rocks. Evolution of Animals and Plants.
3. Wednesday, January 20.
   I. *Animal and Plant Groups.*
   II. *Geologic Time-Table.*
4. Wednesday, January 27.
   The Astral (or Formative) Era. Theories of Earth Origin—Old and New.
5. Wednesday, February 3.
   The Archeozoic (or Earliest Life) Era. Earliest Known Rocks. Evidences of Life. Early Conditions of North America.
6. Wednesday, February 10.
   The Proterozoic (or Earlier Life) Era. Character of the Rocks. Earliest Known Fossils. Iron and Copper Ores. Changes in North America.
7. Wednesday, February 17.
   The Paleozoic (or Ancient Life) Era. Character and Development of the Life. Ages of Invertebrates, Fishes and Amphibians.

8. Wednesday, February 24.
   The Paleozoic (or Ancient Life) Era (Concluded). Character of Rocks (including Coal). Continental Changes. Appalachian Revolution.
9. Wednesday, March 3.
   The Geologic History of Pennsylvania. Part I: Through the Early Eras.
10. Wednesday, March 10.
    The Mesozoic (or Middle Life) Era. Character and Development of Life. Age of Reptiles.
11. Wednesday, March 17.
    The Mesozoic (or Middle Life) Era (Concluded). Character of Rocks. Growth of North America. Sierran and Rocky Mountain Revolutions.
12. Wednesday, March 24.
    The Cenozoic (or Recent Life) Era. Character and Development of the Life. Age of Mammals.
13. Wednesday, March 31.
    The Cenozoic (or Recent Life) Era (Concluded). Character of Rocks. Continental Changes. The Glacial Epoch.
14. Wednesday, April 7.
    The Geologic History of Pennsylvania. Part II: Through the Later Eras.
15. Wednesday, April 14.
    The Psychozoic Era (or Era of Mind). Evidences of Early Man. The Age of Man.
16. Wednesday, April 21.
    Review. Summary and Conclusion.

PUBLICATIONS OF THE INSTITUTE.

Vol. 1.—Explorations on the West Coast of Florida and in the Okeechobee Wilderness. Angelo Heilprin.

Vol. 2.—Report on Fresh-water Sponges Collected in Florida. Edward Potts.

Notice of Some Fossil Human Bones. Joseph Leidy.

Description of Mammalian Remains from Rock Crevice in Florida. Joseph Leidy.

Description of Vertebrate Remains from Peace Creek, Florida. Joseph Leidy.

Notice of Some Mammalian Remains from Salt Mine of Petite Anse, Louisiana. Joseph Leidy.

On Platygonus, an Extinct Genus Allied to the Peccaries. Joseph Leidy.

Remarks on the Nature of Organic Species. Joseph Leidy.

Vol. 3.—Parts 1, 2, 3, 4, 5, 6.—Contributions to the Tertiary Fauna of Florida.
William H. Dall.

Vol. 4.—Fossil Vertebrates from the Alachua Clays, Florida. Joseph Leidy.

Vol. 5.—Study of Hawaiian Skulls.
Harrison Allen.

Notes on the Palæontological Publications of Prof. Wm. Wagner.
William H. Dall.

Vol. 6.—Selenodont Artiodactyls of the Uinta Eocene. W. B. Scott.

Vol. 7.—Contributions to the Mineralogy of the Newark Group in Pennsylvania.
Edward T. Wherry.

A Comparative Study of the Radio-Active Minerals in the Collection of the Wagner Free Institute of Science.
Carl Boyer and Edgar T. Wherry.

Studies in Carbohydrates.
Charles H. LaWall and Sarah S. Graves.

(*Under Department of Chemistry Endowment*)

(In press)

Vegetation of South Florida.
John W. Harshberger.

LECTURES UNDER RICHARD B. WESTBROOK FOUNDATION.

1912.—Ancient Civilization of Babylonia and Assyria. Morris Jastrow, Jr., Ph.D.

1913.—Conservation of Natural Resources. Gifford Pinchot, Marshall O. Leighton, Overton W. Price, Joseph A. Holmes.

1914.—The Theory of Evolution. William Berryman Scott, Ph.D., LL.D.